

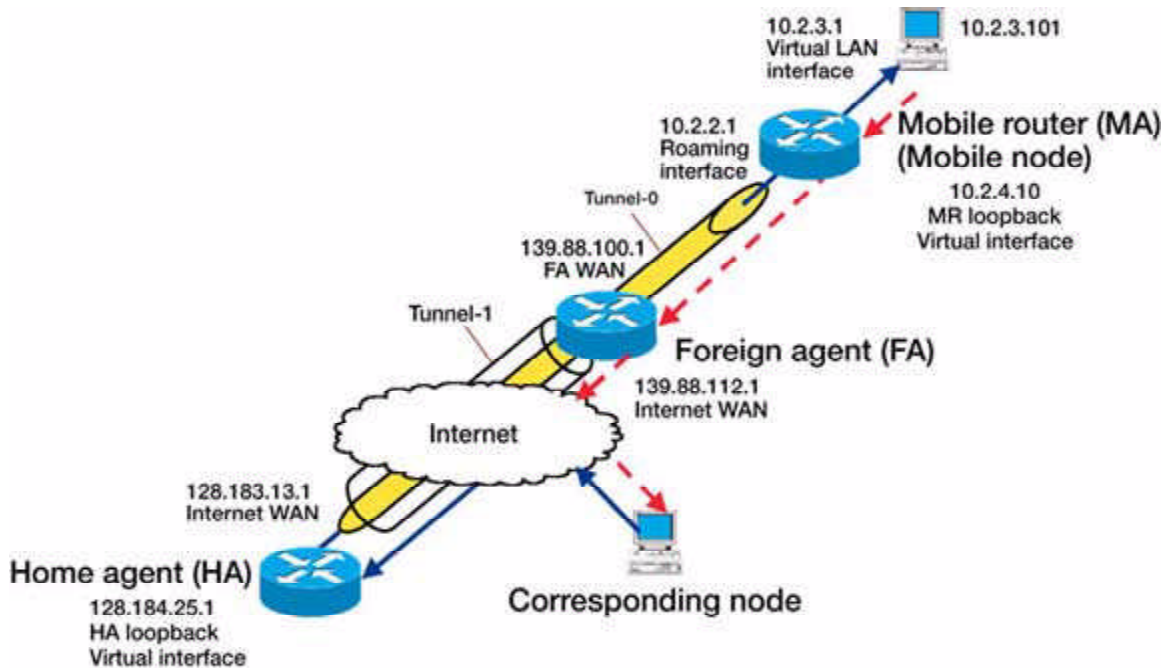
Mobile Router Developed and Tested

The NASA Glenn Research Center, under a NASA Space Act Agreement with Cisco Systems, has been performing joint networking research to apply Internet-based technologies and protocols to space-based communications. As a result of this research, NASA performed stringent performance testing of the mobile router, including the interaction of routing and the transport-level protocol. In addition, Cisco Systems developed the mobile router for both commercial and Government markets. The code has become part of the Cisco Systems Internetworking Operating System (IOS) as of release 12.2 (4) T--which will make this capability available to the community at large.

The mobile router is software code that resides in a network router and enables entire networks to roam while maintaining connectivity to the Internet. This router code is pertinent to a myriad of applications for both Government and commercial sectors, including the "wireless battlefield." NASA and the Department of Defense will utilize this technology for near-planetary observation and sensing spacecraft. It is also a key enabling technology for aviation-based information applications. Mobile routing will make it possible for information such as weather, air traffic control, voice, and video to be transmitted to aircraft using Internet-based protocols. This technology shows great promise in reducing congested airways and mitigating aviation disasters due to bad weather. The mobile router can also be incorporated into emergency vehicles (such as ambulances and life-flight aircraft) to provide real-time connectivity back to the hospital and health-care experts, enabling the timely application of emergency care. Commercial applications include entertainment services, Internet protocol (IP) telephone, and Internet connectivity for cruise ships, commercial shipping, tour buses, aircraft, and eventually cars.

A mobile router, which is based on mobile IP, allows hosts (mobile nodes) to seamlessly "roam" among various IP subnetworks. This is essential in many wireless networks. A mobile router, unlike a mobile IP node, allows entire networks to roam. Hence, a device connected to the mobile router does not need to be a mobile node because the mobile router provides the roaming capabilities.

There are three basic elements in the mobile IP: the home agent, the foreign agent, and the mobile node. The home agent is a router on a mobile node's home network that tunnels datagrams for delivery to the mobile node when it is away from home. The foreign agent is a router on a remote network that provides routing services to a registered mobile node. The mobile node is a host or router that changes its point of attachment from one network or subnetwork to another.



Mobile router tunneling. WAN, wide-area network; LAN, local-area network.

Long description: Diagram shows that the home agent (128.184.25.1) loopback virtual interface connects to an Internet WAN (128.183.13.1) to the Internet to Tunnel-1 to a foreign agent WAN (139.88.100.1) to Tunnel-0 to a virtual LAN interface (10.2.3.1) to 10.2.3.101 to a mobile router loopback virtual interface (10.2.4.10) to a foreign agent Internet WAN (139.88.112.1) to a corresponding node on the Internet back to the home agent.

In mobile routing, virtual communications are maintained by the home agent, which forwards all packets for the mobile networks to the foreign agent. The foreign agent passes the packets to the mobile router, which then forwards the packets to the devices on its networks. As the mobile router moves, it will register with its home agent on its whereabouts via the foreign agent to assure continuous connectivity.

References

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3. Leung, K., et al.: Application of Mobile-ip to Space and Aeronautical Networks. IEEE Aerospace Conference Proceedings, vol. 2, 2001, pp. 21027-21033.

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